

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

1 1. (Currently Amended) A controller system for use in a subterranean well comprising:
2 a controller located in the well; and
3 a signal source capable of putting a command signal into the well;
4 wherein the controller ~~distinguishes an *a priori* unknown, but repeating command signal is~~
5 ~~responsive to a repeating command signal, the command signal previously unknown to the~~
6 ~~controller, the controller responsive to the repeating command signal by actuating a tool.~~

1 2. (Original) The controller system of claim 1 in which the controller further comprises:
2 a memory unit;
3 a microprocessor;
4 a buffer;
5 an analog-to-digital converter; and
6 a downhole tool interface.

1 3. (Original) The controller system of claim 1 in which the signal source provides a
2 pressure sequence.

1 4. (Original) The controller system of claim 1 in which the signal source provides an
2 acceleration.

1 5. (Original) The controller system of claim 1 in which the signal source provides variable
2 flow rates of fluid.

1 6. (Original) The controller system of claim 1 in which the signal source provides
2 variations in applied force.

1 7. (Original) The controller system of claim 1 in which the signal source provides
2 variations in stress or strain.

1 8. (Original) The controller system of claim 1 in which the controller uses at least one
2 computed parameter to distinguish the command signal.

1 9. (Original) The controller system of claim 8 in which the controller further comprises a
2 buffer to store data used to create a first profile and a second profile, and in which the at least
3 one computed parameter includes the correlation coefficient between the first profile and the
4 second profile.

1 10. (Currently Amended) A controller for use in a subterranean well comprising:
2 a memory unit;
3 a microprocessor;
4 a buffer;
5 an analog-to-digital converter; and
6 a downhole tool interface;
7 in which the microprocessor executes a program stored in the memory unit to determine whether
8 to initiate the downhole tool interface based on the recognition of an *a priori* a previously
9 unknown, but repeated command signal, the microprocessor recognizing the command signal in
10 response to detecting that the command signal has been repeated.

1 11. (Original) The controller of claim 10 in which the command signal is sampled by the
2 analog-to-digital converter and the samples are stored in the buffer.

1 12. (Currently Amended) The controller of claim 11 in which a portion of the samples stored
2 in the buffer represent the initial a first command signal and a portion of the samples in the
3 buffer represent the repeated a repetition of the first command signal.

1 13. (Currently Amended) The controller of claim 12 in which the recognition is based on a
2 comparison of the samples representing the initial first command signal to the samples
3 representing the repeated repetition of the first command signal.

1 14. (Original) The controller of claim 10 in which the recognition is based on a computed
2 parameter.

1 15. (Original) The controller of claim 14 in which the computed parameter is a correlation
2 coefficient.

1 16. (Currently Amended) A method to determine whether ~~an *a priori* unknown, but~~
2 ~~repeating a previously unknown~~ command signal has been issued into a well comprising:
3 taking data samples at a desired location in the well;
4 storing the data samples in a buffer;
5 computing parameters using the data samples in the buffer;
6 comparing the computed parameters to pre-defined tolerances; and
7 deciding whether a command signal was issued based on the comparison results.

1 17. (Original) The method of claim 16 in which the computing parameters includes
2 computing a first and second mean, a first and second standard deviation, and a correlation
3 coefficient.

1 18. (Currently Amended) A method to control a downhole tool in a subterranean well
2 comprising:
3 placing a controller in a desired location in the well;
4 sending a repeating signal from a signal source to the controller;
5 recording samples while the signal is being sent in a buffer in the controller to create upper and
6 lower profiles in the buffer;
7 comparing the upper profile to the lower profile to determine whether the profiles constitute a
8 match, ~~wherein the match indicates the repeating signal is a command signal, wherein the~~
9 ~~command signal was previously undefined at the controller;~~ and
10 initiating actuation of the downhole tool if [[a]] ~~the~~ match is found.

- 1 19. (Original) The method of claim 18 in which the comparing includes computing a
- 2 correlation coefficient.
- 1 20. (Original) The method of claim 18 in which the comparing includes comparing the mean
- 2 and standard deviation of the upper profile to the mean and standard deviation of the lower
- 3 profile.
- 1 21. (New) The controller system of claim 1, wherein the controller recognizes the command
- 2 signal in response to detecting a first occurrence of the command signal and repetition of the
- 3 command signal.
- 1 22. (New) The controller system of claim 21, wherein the controller autocorrelates a first
- 2 waveform representing the first occurrence of the command signal with a second waveform
- 3 representing the repetition of the command signal.
- 1 23. (New) The controller system of claim 1, wherein the command signal previously
- 2 unknown to the controller is a pressure profile, and wherein the controller recognizes the
- 3 pressure profile by detecting a first occurrence of the pressure profile and a repetition of the
- 4 pressure profile.
- 1 24. (New) The controller of claim 10, wherein the microprocessor recognizes the command
- 2 signal in response to detecting a first occurrence of the command signal and repetition of the
- 3 command signal.
- 1 25. (New) The controller of claim 10, wherein the command signal previously unknown to
- 2 the microprocessor is a pressure profile, and wherein the microprocessor recognizes the pressure
- 3 profile by detecting a first occurrence of the pressure profile and a repetition of the pressure
- 4 profile.

- 1 26. (New) The method of claim 16, wherein taking the data samples comprises:
 - 2 taking a first sample representing a first occurrence of the command signal; and
 - 3 taking a second sample representing a second occurrence of the command signal.

- 1 27. (New) The method of claim 16, wherein the taking, storing, computing, comparing, and deciding acts are performed by a controller, and wherein the command signal was previously unknown to the controller.